

a first electrode connected with said circuit element and positioned over said circuit element;

a storage capacitor connected with said first electrode and positioned under said first electrode;

an optical reflector formed on said first electrode;

a first orientation film formed on said optical reflector;

a second orientation film spaced apart from said first orientation film;

a second transparent electrode on which said second orientation film is formed;

an oriented layer of liquid crystal material disposed between said first said second electrodes; and

optical blocking means positioned between said first electrode and said circuit element for blocking an incident light from leaking into said circuit element.

25.  
26. A liquid crystal display apparatus for displaying an image, comprising:

a substrate;

a plurality of circuit elements being formed on said substrate;

a first electrode connected with said circuit element and positioned over said circuit element;

a frame disposed along an edge of said first electrode, with said frame comprising an optical blocking for blocking incident light from leaking into said switching element;

a storage capacitor connected with said first electrode and positioned under said first electrode;

an optical reflector formed on said first electrode;

a first orientation film formed on said optical reflector;

62 a second orientation film spaced apart from said first orientation film;

a second transparent electrode; and

an oriented layer of liquid crystal material positioned between said first and second electrodes.

26  
27. A liquid crystal display apparatus for displaying an image, comprising:

a substrate;

a plurality of circuit elements being formed on said substrate;

a first electrode connected with said circuit element and positioned over said circuit element;

optical blocking means formed under said first electrode;

a storage capacitor connected with said first electrode and positioned under said first electrode;

an optical reflector formed on said first electrode;

a first orientation film formed on said optical reflector;

a second orientation film spaced apart from said first orientation film;

a second transparent electrode; and

an oriented layer of liquid crystal material positioned between said first and second electrodes.

27.  
28. A liquid crystal display apparatus for displaying an image, comprising:

a substrate;

a plurality of switching elements being formed on said substrate;

a first electrode connected with said switching element and positioned over said switching element;

a storage capacitor connected with said first electrode and positioned under said first electrode;

an optical reflector formed on said first electrode;

a second transparent electrode on which said second orientation film is formed;

an oriented layer of liquid crystal material positioned between said first and second electrodes; and

substantially nonconductive optical blocking means positioned between said first electrode and said switching element for blocking an incident light from leaking into said switching element.

28.  
29. A liquid crystal display apparatus for displaying an image, comprising:

62  
a substrate;

a plurality of switching elements being formed on said substrate;

a first electrode connected with said switching element and positioned over said switching element;

a frame disposed along an edge of said first electrode, with said frame comprising an optical blocking insulating material for blocking incident light from leaking into said switching element;

a storage capacitor connected with said first electrode and positioned under said first electrode;

an optical reflector formed on said first electrode;

a second transparent electrode on which said second orientation film formed; and

an oriented layer of liquid crystal material positioned between said first and second electrodes.

~~29.~~

30. A liquid crystal display apparatus for displaying an image, comprising:

a substrate;

a plurality of switching elements being formed on said substrate;

a first electrode connected with said switching element and positioned over said switching element;

nonconductive optical blocking material formed under said first electrode;

B2 a storage capacitor connected with said first electrode and positioned under said first electrode;

an optical reflector formed on said first electrode;

a second transparent electrode formed on said second orientation film; and

an oriented layer of liquid crystal material positioned between said first and second electrodes.

~~30.~~

31. A spatial light modulator array for modulating light to form an image comprising:

a plurality of liquid crystal devices positioned over respective

mirrors on a dielectric layer on a semiconductor substrate,

a plurality of electrical circuits formed in said semiconductor

substrate coupled to said liquid crystal devices, respectively, for  
placing a voltage across electrodes of said liquid crystal devices, and  
an absorber layer positioned and patterned with respect to  
said mirrors for shielding said plurality of electrical circuits  
from ambient light,

said absorber layer having an edge overlapping an edge of said  
mirror to form an overlapping region to decrease ambient light from  
passing into said semiconductor substrate.

31.

32. A spatial light modulator array for modulating light to form an image comprising:

a plurality of liquid crystal devices positioned over respective

mirrors on a dielectric layer on a semiconductor substrate,

a plurality of electrical circuits formed in said semiconductor

substrate coupled to said liquid crystal devices, respectively, for

placing a voltage across electrodes of said liquid crystal devices, and

a reflector layer positioned and patterned with respect to

said mirrors for shielding said plurality of electrical circuits

from ambient light,

said reflector layer having an edge overlapping an edge of said mirror to form an overlapping region to decrease ambient light from passing into said semiconductor substrate.

32.  
33.

A method of forming a spatial light modulator array comprising the steps of:

forming a plurality of electrical circuits in a semiconductor substrate positioned for interconnecting with subsequently formed liquid crystal devices, respectively,

forming one or more layers of interconnections above said plurality of electrical circuits,

forming a first dielectric layer over said electrical circuits and said layers of interconnections,

planarizing said first dielectric layer to provide a substantially

planar upper surface on said first dielectric layer,

forming an absorber layer, positioned and patterned with respect to subsequently formed liquid crystal devices for shielding said plurality of electrical circuits from ambient light,

forming a second dielectric layer above said patterned absorber layer, forming studs through said second dielectric layer for electrical connection to subsequently formed mirrors,

forming a plurality of mirrors over said dielectric layer and patterned to form the lower electrode of said plurality of liquid crystal devices, said mirrors overlapping said absorber layer to form a capacitor with respect to said overlapping mirror and to attenuate light traveling between said absorber and said mirror,

forming a plurality of spacers positioned in between selected mirrors of said plurality of mirrors,

applying a layer of liquid crystal material,



orienting said layer of liquid crystal material, and

forming a top electrode of said plurality of mirrors to form said plurality of liquid crystal devices.

33.  
34. A method of forming a spatial light modulator array comprising the steps of:

B2 forming a plurality of electrical circuits in a semiconductor substrate positioned for interconnecting with subsequently formed liquid crystal devices, respectively,

forming one or more layers of interconnections above said plurality of electrical circuits,

forming a first dielectric layer over said electrical circuits and said layers of interconnections,

planarizing said first dielectric layer to provide a substantially

planar upper surface on said first dielectric layer,

forming an reflective layer, positioned and patterned with respect to subsequently formed liquid crystal devices for shielding said plurality of electrical circuits from ambient light,

forming a second dielectric layer above said patterned reflective layer,  
forming studs through said second dielectric layer for electrical connection to  
subsequently formed mirrors,

forming a plurality of mirrors over said dielectric layer and patterned to form the  
lower electrode of said plurality of liquid crystal devices, said mirrors  
overlapping said reflective layer to form a capacitor with respect to said  
overlapping mirror and to attenuate light traveling between said  
reflective and said mirror,

forming a plurality of spacers positioned in between selected mirrors of said  
plurality of mirrors,

applying a layer of liquid crystal material,

orienting said layer of liquid crystal material, and

forming a top electrode of said plurality of mirrors to form said plurality of liquid  
crystal devices.

34.  
35. A liquid crystal display comprising:

a plurality of liquid crystal devices positioned over respective mirrors on a  
dielectric layer on a semiconductor substrate,

a plurality of electrical circuits formed in said semiconductor substrate coupled to said liquid crystal devices, respectively, for placing a voltage across electrodes of said liquid crystal devices, and

a light blocking layer positioned and patterned with respect to said mirrors for shielding said plurality of electrical circuits from ambient light,

said light blocking layer having an edge overlapping an edge of said mirror to form an overlapping region to decrease ambient light from passing into said semiconductor substrate.

35.  
36. A liquid crystal display comprising:

a plurality of liquid crystal devices positioned over respective mirrors on a dielectric layer on a semiconductor substrate,

a plurality of electrical circuits formed in said semiconductor substrate coupled to said liquid crystal devices, respectively, for placing a voltage across electrodes of said liquid crystal devices, and

a light blocking region positioned with respect to said mirrors for shielding said plurality of electrical circuits from ambient light,

said light blocking region being disposed between said mirrors to decrease ambient light from passing into said semiconductor substrate.

36.

37. A liquid crystal apparatus comprising:

a plurality of liquid crystal devices positioned over respective mirrors on a dielectric layer on a semiconductor substrate,

B2 a plurality of electrical circuits formed in said semiconductor substrate coupled to said liquid crystal devices, respectively, for placing a voltage across electrodes of said liquid crystal devices, and

a light blocking region positioned with respect to said mirrors for shielding said plurality of electrical circuits from ambient light.

37.

38. A liquid crystal apparatus comprising:

a plurality of liquid crystal devices positioned over respective mirrors disposed on substrate,

a plurality of electrical circuits formed in said substrate coupled to said liquid crystal devices, respectively, for placing a voltage across electrodes of said liquid crystal devices, and